

WHAT IS CLAIMED IS

1. An electromagnetic coil assembly comprising:

a main coil having a first end and a second end, the main  
5 coil being wound without a bobbin;

a first cover fitted over the main coil from the first  
end of the main coil;

a second cover fitted over the main coil from the second  
end of the main coil; and

10 a molding resin covering the first and second covers.

2. An electromagnetic actuator comprising:

a circular core having an annular groove;

an electromagnetic coil assembly mounted in the annular  
15 groove; and

a circular armature disposed so as to be opposed to the  
circular core with a gap being provided therebetween,

wherein the electromagnetic coil assembly comprises:

a main coil having a first end and a second end,  
20 the main coil being wound without a bobbin;

a first cover fitted over the main coil from the  
first end of the main coil;

a second cover fitted over the main coil from the  
second end of the main coil; and

25 a molding resin covering the first and second

covers.

3. An electromagnetic actuator as set forth in Claim 2,  
wherein the electromagnetic coil assembly further comprises  
5 a search coil embedded in the molding resin.

4. An electromagnetic actuator as set forth in Claim 2,  
wherein the electromagnetic coil assembly is mounted in the  
annular groove with a clearance in a radial direction.

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5. An electromagnetic actuator as set forth in Claim 3,  
wherein the electromagnetic coil assembly is mounted in the  
annular groove with a clearance in a radial direction.

15 6. An electromagnetic actuator as set forth in claim 2,  
further comprising:

a biasing unit for biasing the electromagnetic coil  
assembly in an axial direction;and

a clip for preventing the electromagnetic coil assembly  
20 from being dislocated the annular groove.

7. An electromagnetic actuator as set forth in claim 3,  
further comprising:

a biasing unit for biasing the electromagnetic coil  
25 assembly in an axial direction;and

a clip for preventing the electromagnetic coil assembly from being dislocated the annular groove.

8. An electromagnetic actuator as set forth in claim 4,  
5 further comprising:

a biasing unit for biasing the electromagnetic coil assembly in an axial direction;and

a clip for preventing the electromagnetic coil assembly from being dislocated the annular groove.

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9. An electromagnetic actuator as set forth in Claim 2, wherein the molding resin has a plurality of projections spaced away from each other in a circumferential direction, and wherein the electromagnetic coil assembly is inserted into the annular  
15 groove in such a manner that the projections are brought into abutment with sidewall constituting the annular groove.

10. An electromagnetic actuator as set forth in Claim 3, wherein the molding resin has a plurality of projections spaced  
20 away from each other in a circumferential direction, and wherein the electromagnetic coil assembly is inserted into the annular groove in such a manner that the projections are brought into abutment with sidewall constituting the annular groove.

25 11. An electromagnetic actuator as set forth in Claim 4,

wherein the molding resin has a plurality of projections spaced away from each other in a circumferential direction, and wherein the electromagnetic coil assembly is inserted into the annular groove in such a manner that the projections are brought into  
5 abutment with sidewall constituting the annular groove.

12. An electromagnetic actuator as set forth in Claim 5, wherein the molding resin has a plurality of projections spaced away from each other in a circumferential direction, and wherein  
10 the electromagnetic coil assembly is inserted into the annular groove in such a manner that the projections are brought into abutment with sidewall constituting the annular groove.

13. An electromagnetic actuator as set forth in Claim 2,  
15 wherein the main coil of the electromagnetic coil assembly is a stepped coil having a small diameter portion and a large diameter portion, and wherein electromagnetic coil assembly further comprises a search coil attached to the small diameter portion.

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14. An electromagnetic actuator as set forth in Claim 2, wherein a terminal of the main coil and a terminal of the search coil are disposed so as to be spaced away from each other through  
90 degrees.

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15. An electromagnetic actuator as set forth in Claim 2, wherein a terminal of the main coil and a terminal of the search coil are disposed so as to be spaced away from each other through 180 degrees.

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